Estimation of seafloor impact from demersal trawls, seines and dredges based on gear design and dimensions

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This study estimates the seafloor impact of towed fishing gears from a bottom-up perspective. Traditionally fishing pressure, often in terms of indicators, is calculated top-down using the fishing effort information available in large-scale statistics such as logbook and VMS data. Here we take a different approach using the gear itself (design and dimensions) for understanding and estimation of the physical interactions with the seafloor at the individual fishing operation level. With reference to the métier groupings of EU logbooks, we defined 17 distinct towed gear groups in European waters (11 otter trawl groups, 3 beam trawl groups, 2 demersal seine groups, and 1 dredge group), for which we established seafloor "footprints". The footprint of a gear was defined as the relative contribution from individual larger gear components, such as the trawl doors, sweeps and ground gear, to the total area and severity of the gear impact. An industry-based vessel and gear survey covering 13 different countries provided the basis for estimating the relative impact-area contributions from individual gear components, whereas seafloor penetration and resuspension was estimated for different sediment types based on a review of the scientific literature. For each defined gear group a vessel-size (kW or total length) – gear size (total gear width or circumference) relationship was estimated to enable the prediction of gear footprint area and sediment penetration from vessel size. The implications for the definition and monitoring of fishing pressure indicators are far-reaching, and are discussed in context of an ecosystem approach to fisheries management (EAFM).

Keywords: physical impact, fishing effort, gear footprint, towed gears, vessel size

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